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This document contains information referring to Projects:

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NRO review(s) completed.

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5 NOV 1963

Dr. Brockway McMillan, Director
National Reconnaissance Office
Washington, D. C.

Dear Brock:

Analysis of the resolution distribution of CORONA photography by CIA, prompted by the Purcell Group report, showed that the quality spread is much broader than anyone had expected. Furthermore, this spread cannot be accounted for by a straightforward error analysis of known effects. It is now apparent that we have a great deal to learn about the basic limitations on the quality of satellite photography, especially that produced by the CORONA area search system. One must understand the basic cause of this degradation before one can improve the system or design a significantly improved follow-on system.

Several elements of the CIA have now become interested in this problem and are continuing the inquiry begun under the CORONA improvement study. During the NRO program review meeting of 22 October 1963, Mr. McCone and Mr. Gilpatric agreed that CIA/DD/S&T should establish a research group to explore the whole range of engineering and physical limitations on satellite photography using

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the best of our national technical resources. The following provides our present thinking on how we intend to carry this out and suggests certain support from the NRO staff, which is likely to be needed as we move forward.

We will convene a Satellite Photography Working Group which will address itself to both the immediate question of present system improvement and to longer term problems which are fundamental to the design of future systems. The objectives noted below encompass both areas. Significant information for the solution of certain immediate problems ought to be available in approximately three months. However, it is recognized that this initial effort may indicate the desirability and nature of a long-term continuing effort of this general type.

Objectives

ILLEGIB

The objective of this group shall be to examine existing satellite and aircraft photography in detail and to explore the following points:

a. To conduct a detailed examination of satellite and aircraft photography and the system which produced it in order that:

(1) A statistically meaningful quantitative model of the present image quality can be derived.

(2) The various factors affecting image quality can be clearly identified and understood.

b. To combine the data obtained into a system model which satisfactorily represents

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the observed performance, including the effects of the atmosphere.

e. To use the system model derived to examine the possibility for system optimization in order to minimize the effects of the various contributors to image degradation.

d. To plan such experiments as may be required to gain needed additional insight.

e. To recommend system or operational improvements for the present systems which will significantly improve the distribution of quality.

f. To make a careful study of the interaction of the photo interpreters with the film so as to establish a quantitative measure of the significance of stereo coverage, color photography, film contrast and resolution.

g. To exploit the understanding gained to devise ways in which the basic area search and high resolution spotting requirements can be accomplished with significantly improved resolution with high confidence and to suggest new systems to fulfill these requirements.

h. To determine the relationship between the various measures of image quality.

i. To generate an operationally useful objective measure of image quality.

Arrangements

The group will work primarily at the National Photographic Interpretation Center where the basic film

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data base is exploited and stored. NPIC will make suitable offices, supporting personnel and technical services available for the entire three-month period. Of course, it will also be desirable to have the group or individuals visit Eastman and Westover from time to time, and we may need substantial technical support in the film processing and quality measuring areas. Some of the group may even find it useful to visit the preparation, loading and launching facilities on the West Coast, although I would expect this to be carefully focused on the objectives stated above.

We will convene the working party on 13 November at NPIC. We will begin with a two-day seminar during which we will explain the problem, describe the various systems and outline the program for the following three months. We will undoubtedly wish to call on the NRO staff or General Greer as appropriate for some of these briefings. I expect that the individuals will then return briefly to their parent organizations to gather relevant materials and organize appropriate support, after which they will return to Washington on a full-time basis.

Since we are considering individuals who are already cleared for one or more programs [redacted] it is expected that security will pose no problems. However, in view of recent decisions by the DCI regarding clearance procedures for persons working at NPIC, it is likely that everyone will be polygraphed. We propose to clear the group for IDEALIST, OXCART, CORONA, LANYARD, [redacted] ARGON, [redacted] TALENT, KEYHOLE and COMINT. The DD/S security office will handle this task, working with the CIA Director of Security.

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Staffing and Organization

I expect to create a working task force of technically qualified individuals from both Government and

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[redacted]

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contractor organizations. We will appoint a study director for the entire program, probably from academic life. He will be assisted by [redacted] the Deputy Assistant Director for the Office of Research and Development in DD/S&T. The DD/S&T Systems Analysis Group will be exploring the needs for various kinds and qualities of coverage in parallel and this may have important technical interactions. 25X1

The main line of effort will be supplied by one or two people from each of the organizations who are principally concerned in developing, operating and processing satellite photography, especially in the CORONA program. We have contacted management of the organizations listed below, and full-time commitments for these individuals for three months have now been obtained. The individuals named were selected jointly by the DD/S&T and the companies concerned based on proven technical expertise in the field.

a. ITEK

25X1 [redacted]

25X1

b. [redacted]

25X1 [redacted]

c. LOCKHEED

25X1 [redacted]

d. EASTMAN KODAK

Two senior men committed, but to be named.

In addition, we may also add a senior man from Human Factors Research who would explore the photo intelligence impedance into which the entire reconnaissance effort is coupled. We will arrange a significant amount of

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[redacted]

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staff support at NPIC to the group. In addition to the contractor personnel, [redacted] of NPIC will be a working member of the study group and I would hope that one or more technical specialists from the NRO staff could also be made available nearly full-time for this effort.

FUNDING

In the interest of launching this effort promptly we will fund the activity out of CIA funds contained within the regular DD/S&T research budget. However, since the effort will benefit the NRO program as a whole, we feel that DD/S&T should be reimbursed from FY 64 NRO funds. It is difficult to estimate how much will be required to pay salaries and travel expenses since this will be determined largely by the individual arrangements we are making with the companies involved. I assume that CIA and other government members will serve at no cost. Therefore, I think that a planning figure of [redacted] ought to be adequate for the first three months.

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SUPPORT REQUESTED

I believe that we are well launched on this enterprise, but would welcome any comments on the objectives you have time to make. Certainly, the effort should be so constructed as to be of maximum value to your program. As noted above, we will probably require three types of support from the NRO:

a. Designation of a liaison officer on the NRO staff who can support the group by arranging visits and briefings.

b. Nomination of one or more technical individuals from the NRO staff who could serve under the chairman as working members of the group.

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[redacted]

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c. Agreement to reimburse DD/S&T for [redacted] 25X1
the direct costs of this group up to [redacted]
out of FY 64 NRO funds.

We would, of course, welcome your continuing interest and participation during the course of the research.

Sincerely yours,

25X1 [redacted]

Albert D. Wheelon
Deputy Director

cc: Dr. Fubini, DOD

Distribution:
Orig [redacted] - Addressee
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25X1 1 - [redacted]
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DDS&T/ADWheelon/[redacted] 4 Nov 63

1 - Secretary Briefed by separate letter.

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